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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/687,130	10/12/2000	Robert Alan Cochran	10992807-1	1247

7590   10/03/2002

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EXAMINER
TO, BAOQUOC N

ART UNIT	PAPER NUMBER
2172	

DATE MAILED: 10/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

Office Action Summary	Application No.	Applicant(s)
	09/687,130	COCHRAN ET AL.
	Examiner	Art Unit
	Baoquoc N To	2172

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1)☒ Notice of References Cited (PTO-892) 4)☐ Interview Summary (PTO-413) Paper No(s). _____ .
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5)☐ Notice of Informal Patent Application (PTO-152)
3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ . 6)☐ Other: .

DETAILED ACTION

1.   Claim 1-19 are presented for examination.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for

all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described
> as set forth in section 102 of this title, if the differences between the subject matter sought to
> be patented and the prior art are such that the subject matter as a whole would have been
> obvious at the time the invention was made to a person having ordinary skill in the art to which
> said subject matter pertains. Patentability shall not be negatived by the manner in which the
> invention was made.

2.   Claims 1-6, 8-12 and 16-17 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Ofek (US. Patent No. 6,101,497) in view of Breitbart et al.

(US. Patent No. 5,999,931).

Regarding on claim 1, Ofek teaches method for backing up a

computer-readable object stored on a first logical device unit, the method

comprising:

when the object is not currently mirrored to a mass storage device,

creating a mirror for the object on a second logical device unit on a mass storage

device [col. 8, lines 53-56];

when the object and the mirror for the object are split, resyncing the object

with the mirror for the object [col. 9, lines 10-18];

splitting the object and the mirror for the object so that the mirror becomes

a backup copy of the object and so that I/O requests directed to the object are

not automatically directed to the mirror [col. 9, lines 10-18];

Ofek does not explicitly teach retrieving a current timestamp from the

second logical device and saving it as a saved timestamp; updating the

timestamp upon executing any 1/0 operation directed to the second logical

device that alters data stored on the second logical device; when the object is

determined to need to be restored from the mirror, retrieving a current timestamp

from the second logical device; comparing the retrieved current timestamp to the

saved timestamp; when the current timestamp is equal to the saved timestamp,

copying the mirror to the first logical device to replace or again create the object

on the first logical device. However, Breitbart teaches, "a given transaction Ti

submits its set of data items in a preprocessing step, the transaction is assigned

a timestamp, and the set is broadcast to all physical sites in the system" [col. 3,

lines 40-43]. This teaches that the transaction has a current timestamp and by

broadcasting to other physical site updates the time of the transaction. In

addition, Breitbart teaches, "when Ti submits a write operation on a secondary

copy of a data item, the timestamp of Ti is compared to that of the transaction

which executed the last write on the data item. If the timestamp is less than that

of the last write on the data item, the Ti write operation is not performed.

Otherwise, the Ti write operation is sent to the local database management

system for execution" [col. 3, lines 47-54]. This teaches that the transaction Ti

writes to the second copy only if the timestamp is the same from the last

operation. Therefore, it would have been obvious to one ordinary skill in the art

at the time of the invention was made to modify the teaching of Breitbart into

Ofek in order to provide an update propagation and other concurrency-control

operations in a distributed database system in which replicated data items are

processed at multiple sites, such that global serializability of a transaction

schedule can be ensured, while the likelihood of deadlocks is substantially

reduced and other problem associated with the conventional approaches are

avoided.

Regarding on claims 2 and 8, Ofek teaches including copying the object to

a second backup copy on a difficult-to-modify mass storage device after splitting

the object and the mirror for the object [col. 1, line 40-43].

Regarding on claims 3 and 9, Ofek teaches when the current timestamp is

not equal to the saved timestamp, copying the second backup copy from the

difficult-to-modify mass storage device to the first logical device to replace or

again create the object on the first logical device [col. 3, lines 48-52].

Regarding on claims 4 and 10, Ofek teaches the mass storage device is

one or more hard disk drives and the difficult-to-modify mass storage device is a

tape drive [col. 1, lines 40-43].

Regarding on claims 5 and 11, Breitbart teaches the first and second logical units are provided by one or more disk array controllers, wherein data stored to the first and second logical units are stored by the one or more disk array controllers on one or more hard disk drives, and wherein the one or more disk array controllers provide timestamps to requesting applications and systems and update the timestamp associated with a logical device upon executing 1/O operations directed to the logical device that alters data stored on the logical device [col. 13, lines 12-37].

Regarding on claims 6 and 12, Breitbart teaches prior to retrieving a current timestamp from the second logical device and saving it as a saved timestamp, enabling time stamping on the second logical device unit, and wherein the timestamp is updated upon executing any 1/0 operation directed to the second logical device that alters data stored on the second logical device only when timestamping in enabled on the second logical device unit [col. 12, lines 27-53].

Regarding on claim 16, Breitbart teaches the current state metric is a timestamp [col. 12, lines 11-19].

Regarding on claim 17, Breitbart teaches the controller updates the timestamp by saving a current time [col. 12, lines 23-26].

3.   Claims 7 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ofek (US. Patent No. 6,101,497) in view of Lin et al. (US. Patent No. 5,713,017).

Regarding on claims 7, Ofek teaches method for backing up a computer-readable object stored on a first logical device unit, the method comprising:

when the object is not currently mirrored to a mass storage device, creating a mirror for the object on a second logical device unit on a mass storage device [col. 8, lines 53-56];

when the object and the mirror for the object are split, resyncing the object with the mirror for the object [col. 9, lines 10-18];

splitting the object and the mirror for the object so that the mirror becomes a backup copy of the object and so that I/O requests directed to the object are not automatically directed to the mirror [col. 9, lines 10-18];

Ofek does not explicitly teach retrieving a current count from the second logical device and saving it as a saved count; updating the count upon executing any 1/0 operation directed to the second logical device that alters data stored on the second logical device; when the object is determined to need to be restored from the mirror, retrieving a current count from the second logical device;

comparing the retrieved current count to the saved count; when the current count

is equal to the saved count, copying the mirror to the first logical device to

replace or again create the object on the first logical device. However, Lin

teaches, "when the server receives the update request, it will compare the

sequence number, Mi, stored in the message and the I_Counter. If Mi is larger

then the I_counter by 1, then the server will update its local file system and

increment the "I_Counter" to indicate that the update request has been serviced.

If Mi is equal to or less than the I_Counter, the update request is a duplicate and

is discard" [col. 7, lines 60-67]. This teaches that one of the replica is the local

file with comparing to the server file containing the counter. In the event of

update or crash, the Mi compare with the I_Counter to update or to recover the

file from the file server. Therefore, it would have been obvious to one ordinary

skill in the art at the time of the invention was made to modify the teaching of Lin

into Ofek in order to synchronize multiple updates to a replicate file and allow

updates to replicate file server even though one of the file servers has failed.

Regarding on claim 18, Ofek does not explicitly teach the current state

metric is a counter. However, Lin teaches, "if the system failure occurs, then the

value van be retrieved in the event the system is back up" [col. 7, lines 14-16].

This teaches the counter is retrieved for use in the backup when the system is

down. The current state metric is a counter. Therefore, it would have been

obvious to one ordinary skill in the art at the time of the invention was made to

modify the teaching of Lin into Ofek in order to provide a synchronization of

multiples updates to a replicated file and a recovery from the replicas in the event

of system failures

Regarding in claim 19, Lin teaches the controller updates the counter by

incrementing the counter [col. 7, lines 14-19].

4.   Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Ofek (US. Patent No. 6,101,497)

Regarding on claim 13, Ofek teaches a mass storage device that provides

logical device units to accessing computers, the mass storage device comprising:

a medium for storing data [col. 7, lines 49-53];

data writing and reading devices for writing data to the medium and

reading data from the medium;

memory (memory 19) [col. 7, lines 49-53] and logic processing

components [col. 7, lines 54-67]; and

a controller that executes within a logic processing component and

controls reading and writing of data to and from the memory and to and from the

medium, the controller providing, in a addition to execution 1/0 operations,

including of read and write operations, to and from logical device units

comprising portions of the medium for storing data [col. 8, lines 1-17], mirroring of

an object stored on a first logical device unit to a mirror object stored on a second

logical device unit [col. 8, lines 25-65]. However, Ofek does not explicitly teach a

current state metric for each logical device unit that can be requested by an

accessing computer. However, Ofek teaches, "if the sum for the status of a track in step 121 is "01", the tracks need to be resynchronized. Step 121 then transfers to step 114 to copy the track from the local system 10 to the remote system 11" [col. 14, lines 34-37]. This teaches the state of the state of the system is access to allow the resynchronization processes. Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to include the status of a track in order to provide a data processing system that that stores a data base on redundant storage devices and that enables the system to run application, concurrently with other applications, such as decision support system application, having the capability of altering data stored in disk storage device.

Regarding on claim 14, Ofek teaches the controller updates the current state metric for a logical device unit whenever the controller executes an 1/O operation that changes the data, stored on the medium for storing data, included in the logical device unit's data [col. 10,lines 51-67].

Regarding on claim 15, Ofek teaches 1/O operations directed to a logical device unit that enables maintenance of a current state metric for the logical device unit and disables maintenance of a current state metric for the logical device unit, and wherein the controller updates the current state metric only when maintenance of a current state metric for the logical device unit is enabled [col. 12, lines 54-65].

Conclusion

5.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Baoquoc N. To whose telephone number is (703) 305-1949 or via e-mail BaoquocN.To@uspto.gov. The examiner can normally be reached on Monday-Friday: 8:00 AM – 4:30 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Y. Vu can be reached at (703) 305-4393.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231.

The fax numbers for the organization where this application or proceeding is assigned are as follow:

- (703) 746-7238   [After Final Communication}]
- (703) 746-7239   [Official Communication]
- (703) 746-7240   [Non-Official Communication]

Hand-delivered responses should be brought to:

Crystal Park II

2121 Crystal Drive

Arlington, VA 22202

Fourth Floor (Receptionist).

Baoquoc N. To

September 23, 2002

SHAHID AL ALAM
PATENT EXAMINER